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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/663,752	09/17/2003	Tohru Den	03500.014806.1	3824

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EXAMINER	
DIAMOND, ALAN D	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 08/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/663,752	DEN, TOHRU	
	Examiner	Art Unit	
	Alan Diamond	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *42 and 44-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *42 and 44-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 July 2004 and 17 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 09/665,983.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Comments

1. The 35 USC 112, second paragraph, rejection of claim 46 has been overcome by Applicant's amendment of the claim.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 42, 44-48, and 50 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-53 of U.S. Patent No. 6,649,824 (Den et al) in view of Skotheim (U.S. Patent 4,190,950). Claim 1 of Den et al teaches a dye-sensitized photoelectric conversion device comprising an electron acceptive charge transfer layer, an electron donative charge transfer layer, and a light absorption layer existing between the charge transfer layers, and either one of the charge transfer layers is a semiconductor acicular crystal layer comprising an aggregate of acicular crystals, and wherein the acicular crystals comprise a metal oxide. With respect to instant claim 44, see claims 9-11 of Den et al. With respect to instant

claims 45 and 50, see claims 3 and 4 in Den et al. With respect to instant claim 47, see claim 26 in Den et al. With respect to claim 48, the requirement that the angle between the axial direction of the acicular crystals and the surface of the substrate is 60 degrees or more is encompassed by the claims of Den et al, in view of Figures 1B, 1D, 3B, 3D, 4A-4D, 5A-5D, 9A, and 9B, in Den et al which clearly show an angle of greater than 60 degrees. The claims of Den et al teach the limitations of the instant claims, the difference being that the claims of Den et al do not specifically teach that said light absorption layer is a semiconductor. Skotheim teaches dye-sensitzed solar cells, wherein, as seen in Skotheim's Figure 3, the dye-sensitized solar cells can be stacked. Said Figure 3 shows four stacked cells 10, 10', 10", 10"'. Stacking of the solar cells is done to achieve higher efficiency by using dyes that absorb at different wavelengths in the stacked cells (see col. 4, lines 26-50). Skotheim uses the same semiconductors for its dye-sensitized semiconductor layer as in the claims of Den et al, i.e., titanium oxide, zinc oxide, or tin oxide (see col. 3, lines 55-59, in Skotheim; and claims 9-11 in said parent). The titanium oxide, zinc oxide, or tin oxide will absorb some light, even if it is only a relatively small or a minute amount compared to the dye (see col. 3, lines 55-59, of Skotheim). Furthermore, the titanium oxide, zinc oxide, or tin oxide semiconductor is used for photoelectric conversion as here claimed. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared the dye-sensitized photoelectric conversion device in the claims of Den et al as a stacked device wherein, for example, four cells are stacked on each other, because stacking is done to achieve higher efficiency by using dyes that absorb at different wavelengths in the

stacked devices, as taught by Skotheim. The titanium oxide, zinc oxide, or tin oxide semiconductor layer in a middle cell would then encompass the semiconductor of the instant light absorption region. This semiconductor will be between the electron acceptive charge transfer layer of the top (or bottom) cell and the electron donative charge transfer layer of the bottom (or top) cell. As noted above, the titanium oxide, zinc oxide, or tin oxide will absorb some light, even if it is only a relatively small or a minute amount compared to the dye. Furthermore, with respect to instant claim 46, said titanium oxide, zinc oxide, and tin oxide are direct transition semiconductors. With respect to the electrode regions recited in instant claim 42, these are conventional in the art to make an operative photoelectric device, and Skotheim clearly has them in its Figures 1 and 3.

4. Claim 49 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-53 of U.S. Patent No. 6,649,824 (Den et al) in view of Skotheim (U.S. Patent 4,190,950) as applied to claims 42, 44-48, and 50 above, and further in view of Tchernev (U.S. Patent 3,925,212) and Akuto et al (U.S. Patent 5,346,785). The claims of Den et al, in view of Skotheim, as relied upon for the reasons recited above, teach the limitations of claim 49, the difference being that the claims of Den et al, in view of Skotheim, do not specifically teach the use of CuI or NiO for the semiconductor, in place of said titanium oxide, zinc oxide, or tin oxide. Tchernev teaches that NiO, titanium dioxide and zinc oxide can be substituted for each other as the semiconductor in a solar energy conversion device (see col. 5, lines 27-36). Akuto et al teaches that CuI, titanium dioxide and zinc oxide can be substituted for each

other as the semiconductor in a photoelectrode (see col. 12, lines 15-24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted NiO or CuI for the titanium dioxide or zinc oxide in the photoelectric conversion device in the claims of Den et al, in view of Skotheim, because the substitution of art recognized equivalents, as shown by Tchernev and Akuto et al would have been with the level of ordinary skill in the art.

5. Claims 42, 44-48, and 50 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 11 and 12 of copending Application No. 10/959,177 (Okura et al) in view of Skotheim (U.S. Patent 4,190,950). Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 11 of Okura et al teaches a photoelectric conversion device comprising an electron acceptive charge transporting layer, an electron donative charge transporting layer, and a light absorption layer existing between the charge transporting layers, and wherein electron acceptive charge transporting layer comprises a zinc oxide acicular crystal structure, and wherein the zinc oxide is formed using the electrodeposition method recited at the last four lines of the claim. When said claims 11 and 12 are read in light of Okura et al's specification, in particular Examples 10-12 at pages 44-52 which refer to Figure 1B, it is seen that the zinc oxide crystals are an aggregate of acicular crystals, have an angle between the axial direction of the acicular crystal and the surface of the substrate of 60 degrees or more (see Figure 1B), and that the photoelectric conversion device has zinc oxide having the aspect ratio in instant claims 45 and 50 (see page 45, lines 12-14; page 47,

lines 25-27; and page 50, lines 9-11). With respect to claim 47, in each of Okura et al's Examples 10-12 (i.e., the examples where a photoelectric conversion device is prepared), the zinc oxide has a dye adsorbed on its surface, and this dye encompasses the particle of said claim 47. The claims of Okura et al teach the limitations of the instant claims, the difference being that the claims of Okura et al do not specifically teach that said light absorption layer is a semiconductor. Skotheim teaches dye-sensitzed solar cells, wherein, as seen in Skotheim's Figure 3, the dye-sensitized solar cells can be stacked. Said Figure 3 shows four stacked cells 10, 10', 10'', 10'''. Stacking of the solar cells is done to achieve higher efficiency by using dyes that absorb at different wavelengths in the stacked cells (see col. 4, lines 26-50). Skotheim uses the same semiconductor for its dye-sensitized semiconductor layer as in the claims of Okura et al, i.e. zinc oxide (see col. 3, lines 55-59, in Skotheim). The zinc oxide will absorb some light, even if it is only a relatively small or a minute amount compared to the dye (see col. 3, lines 55-59, of Skotheim). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared the photoelectric conversion device in the claims of Okura et al as a stacked device wherein, for example, four cells are stacked on each other, because stacking is done to achieve higher efficiency by using dyes that absorb at different wavelengths in the stacked devices, as taught by Skotheim. The zinc oxide semiconductor layer in a middle cell would then encompass the semiconductor of the instant light absorption region. This semiconductor will be between the electron acceptive charge transporting layer of the top (or bottom) cell and the electron donative charge transporting layer of

the bottom (or top) cell. As noted above zinc oxide will absorb some light, even if it is only a relatively small or a minute amount compared to the dye. Furthermore, the zinc oxide semiconductor is used for photoelectric conversion as here claimed. With respect to instant claim 46, zinc oxide is a direct transition semiconductor. With respect to the electrode regions recited in instant claim 42, these are conventional in the art to make an operative photoelectric device, and Skotheim clearly has them in its Figures 1 and 3.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

6. Applicant's arguments filed June 17, 2005 have been fully considered but they are not persuasive.

Applicant argues that the Office action does not demonstrate that the semiconductor acicular crystal layer would perform the function of photoelectric conversion, and that "[i]n fact, the Office Action acknowledges that the semiconductor acicular crystal layer might absorb only a relatively small amount of light." However, this argument is not deemed to be persuasive because since the semiconductor acicular crystal layer is an electron donative charge transfer layer or an electron acceptive charge transfer layer, it is "for photoelectric conversion" as here claimed. The devices claimed by Den et al and Okura et al are photoelectric conversion devices. Applicant has not shown that said semiconductor acicular crystal layer would not function "for photoelectric conversion". Furthermore, since the titanium oxide, zinc oxide, or tin oxide that make up the semiconductor acicular crystal layer will absorb some light, even if it is

only a relatively small or a minute amount compared to the dye, then the semiconductor acicular crystal layer is also a light absorption layer.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond
Primary Examiner
Art Unit 1753

Alan Diamond
August 23, 2005